Regional wildland fire threats to surface water supplies

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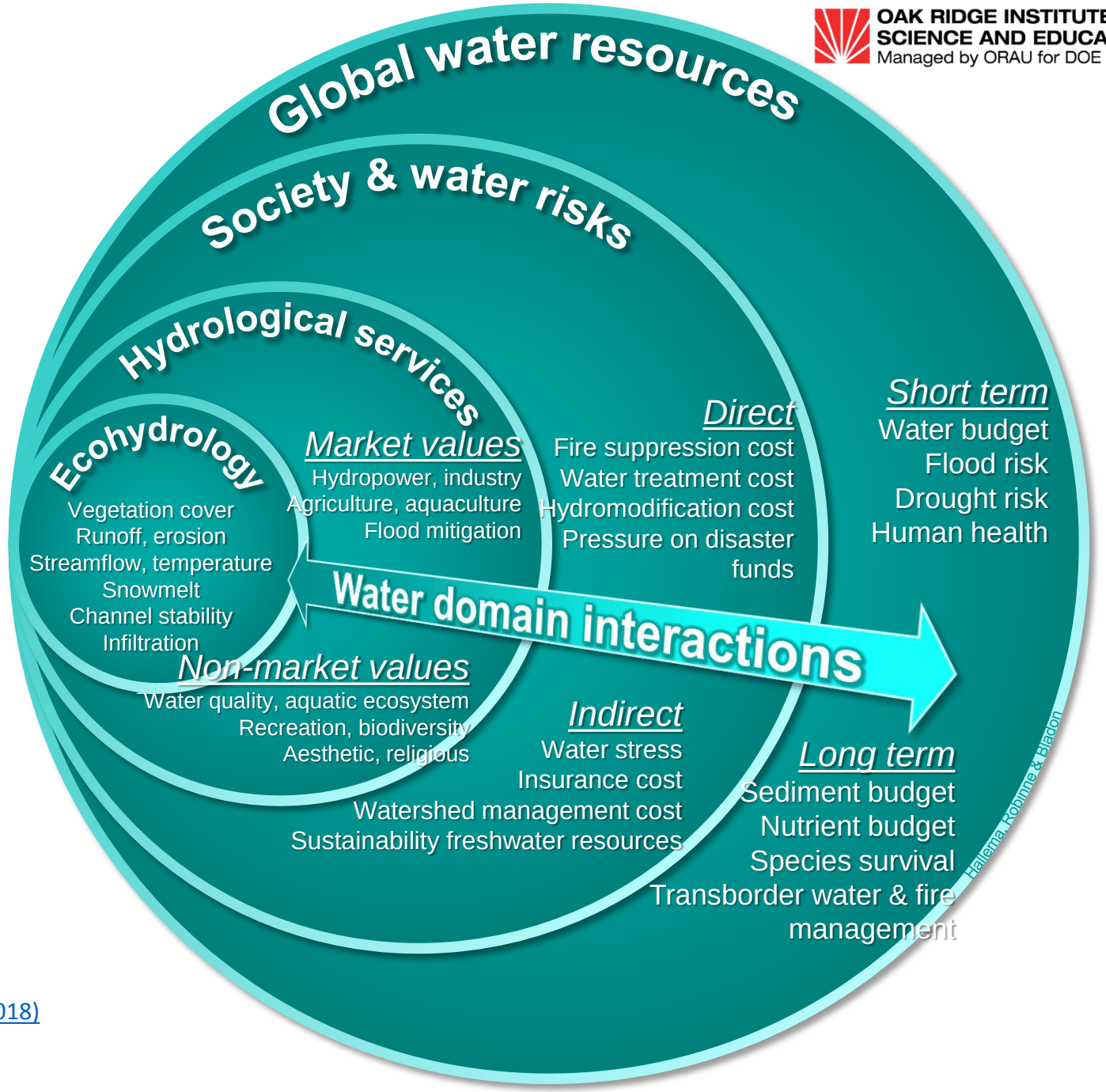
Water-related concerns

- More large forest fires & longer wildfire season
- More drought + denser forests due to fire suppression →
- Concerning for water supplies, because forest rivers supply water for:
  - Irrigation
  - Industry
  - Hydropower
  - Recreation
  - Drinking water

Wildfire impacts



Hallema, Robinne & Bladon, Earth's Future (2018)

Complex interactions:
Post-fire ecohydrology ⟷ hydrological services

Challenges:

- Local interactions not fully understood →
- Difficult to scale post-fire characteristics (infiltration, soil hydraulic conductivity, runoff generation), poorly represented in models
- Regional interactions likely even more complex

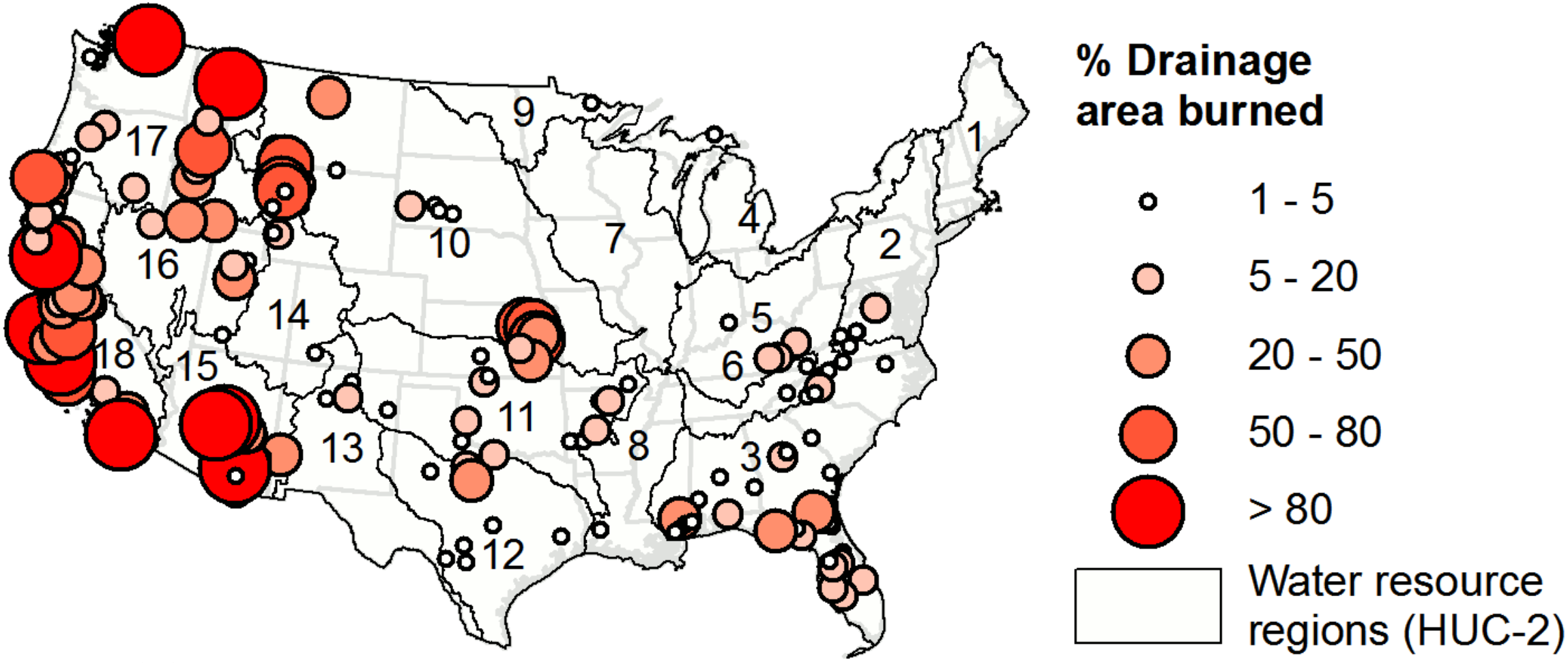
Hallema, Robinne & Bladon, Earth's Future (2018)

Research needed to:

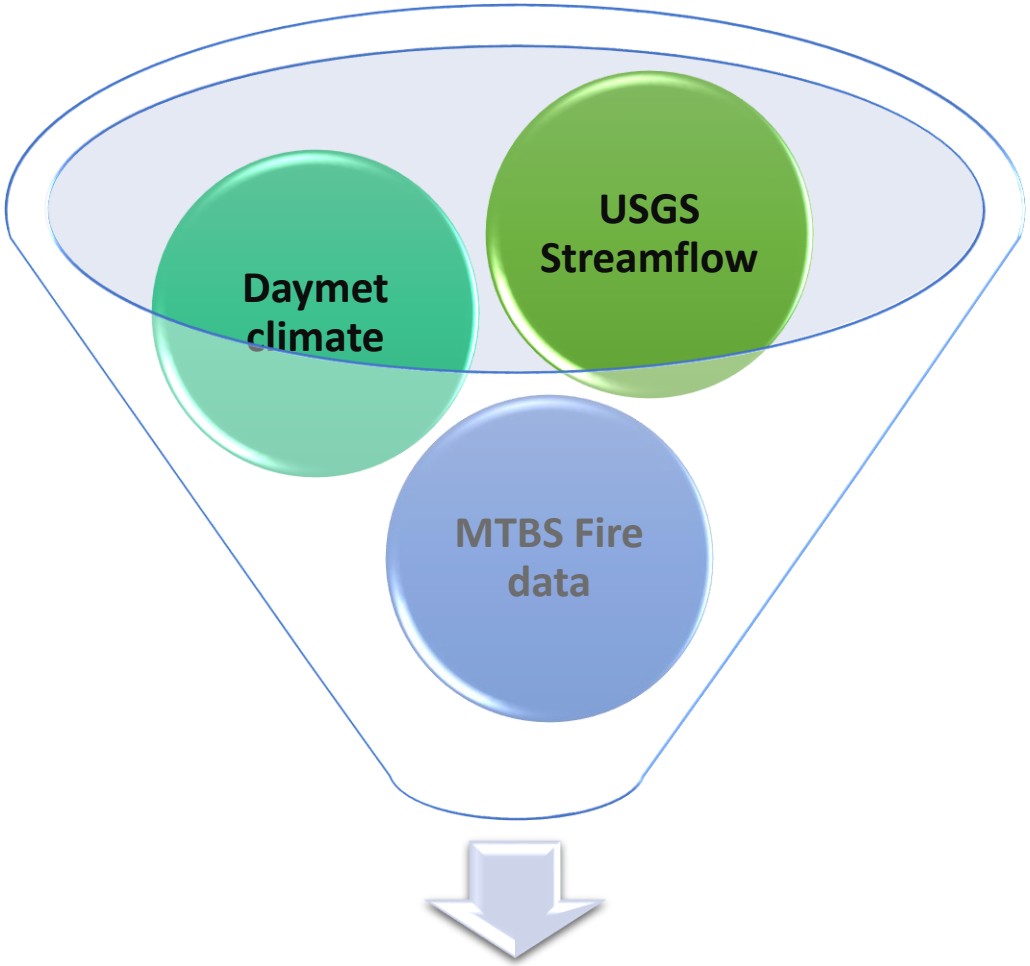
- Find indicators to assess full range of wildfire hazards to water supply
- Assess capacity of watersheds & users to absorb/mitigate fire impacts
- Provide information useful for safeguarding water supply & health

Objective: CONUS assessment of wildland fire impacts on watershed annual streamflow

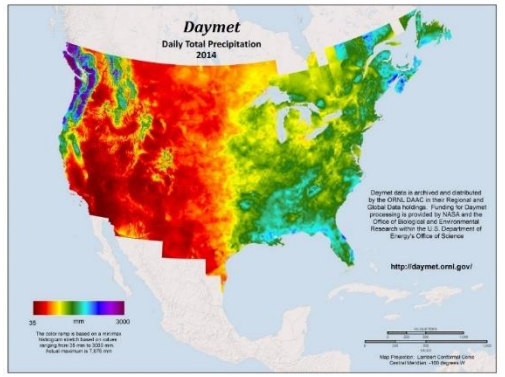
% Drainage area burned 1984-2008



Hallema & others, Nature Communications (2018)



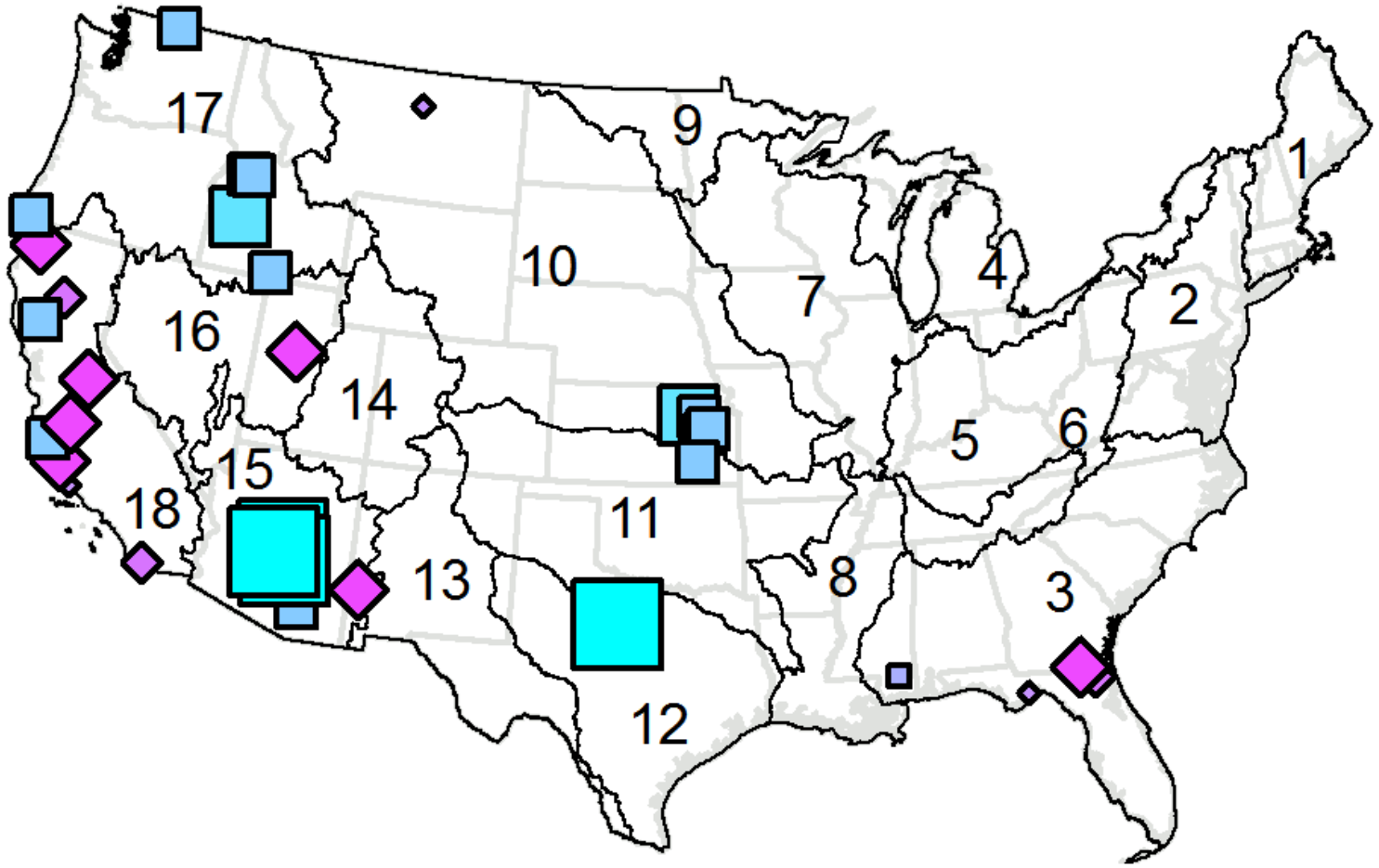
MTBS
Monitoring Trends in Burn Severity



Impact assessment

Hallema & others, Nature Communications (2018)

% Change in annual streamflow (5 year post-fire) USGS Measurement



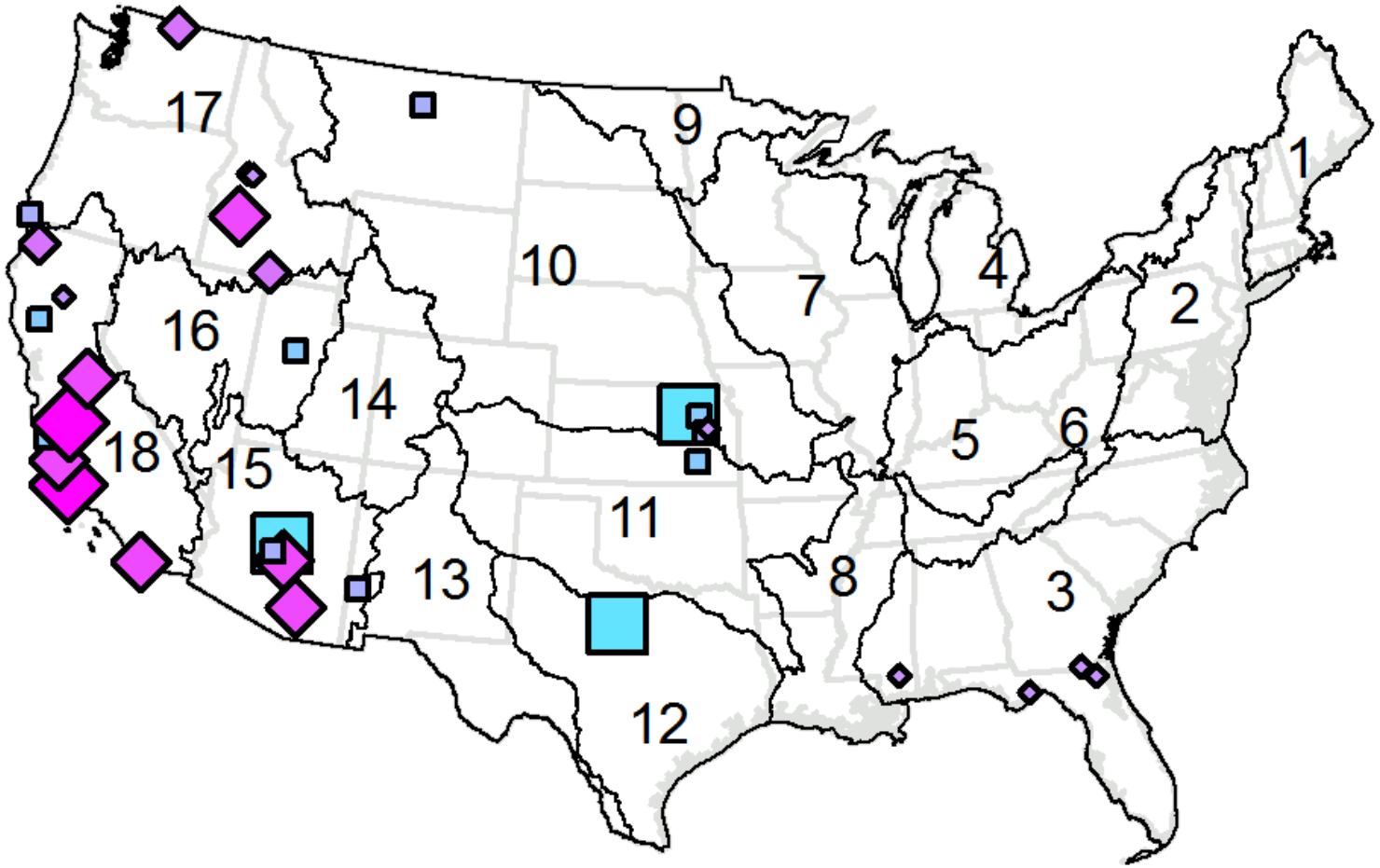
% Change

- > 100
- 50 - 100
- 10 - 50
- 0-10
- -10 - 0
- -50 - -10
- -100 - -50
- < -100
- Water resource regions (HUC-2)

1 New England
2 Mid-Atlantic
3 South Atlantic-Gulf
4 Great Lakes
5 Ohio
6 Tennessee
7 Upper Mississippi
8 Lower Mississippi
9 Souris-Red-Rainy
10 Missouri
11 Arkansas-White-R
12 Texas-Gulf
13 Rio Grande
14 Upper Colorado
15 Lower Colorado
16 Great Basin
17 Pacific Northwest
18 California

Hallema & others, Nature Communications (2018)

% Change in annual streamflow (5 year post-fire) Expected based on climate variability



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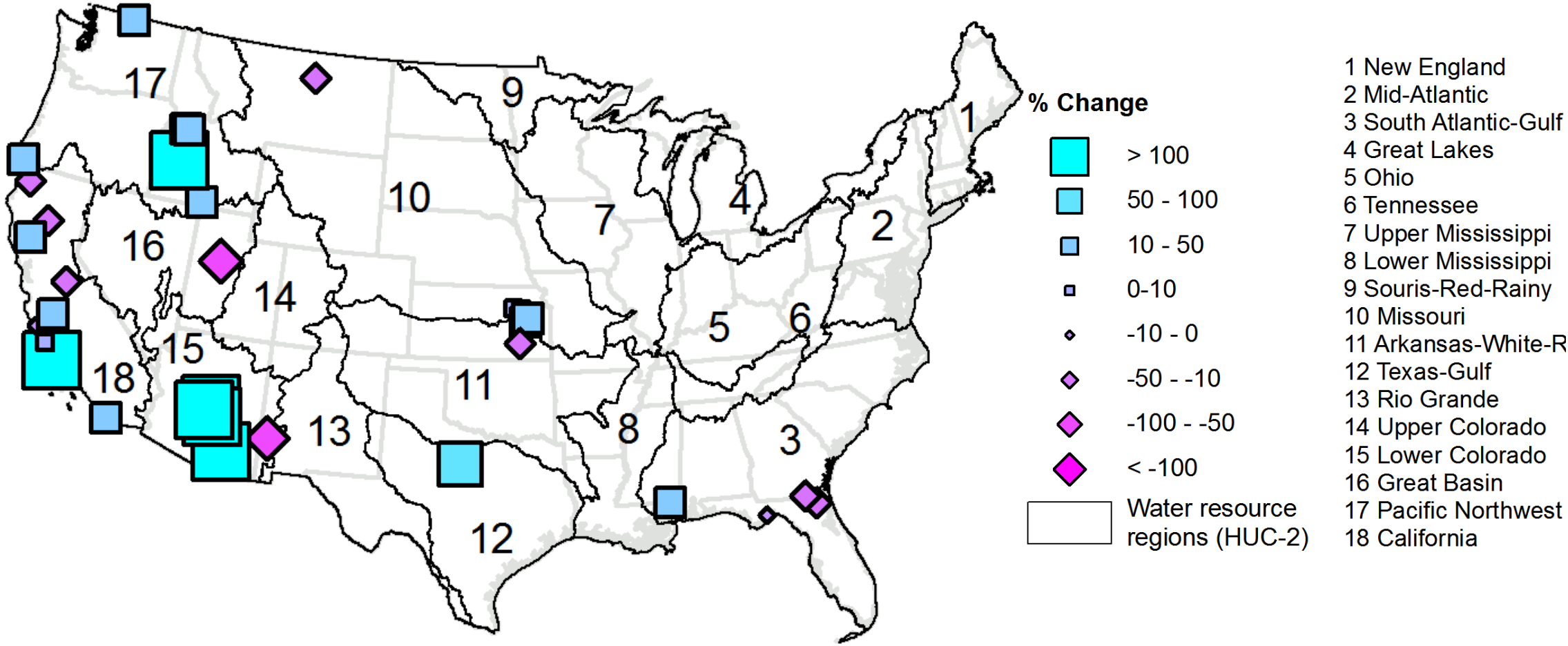
Hallema & others, Nature Communications (2018)

% Change in annual streamflow (5 year post-fire) Associated with wildland fire



Hallema & others, Nature Communications (2018)

Take-home: Burned forests impact water supplies

Good news: Streamflow increase can potentially reduce water supply stress in drought areas

Bad news: Burned forests can cause immediate water quality problems from soil erosion, pollute drinking water

SE dependent on forest water supplies—Rx often too small (1/5 of basin) to affect streamflow

Hallema & others, Nature Communications (2018)

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Further reading:

- Burned forests impact water supplies. Nature Communications (2018).
- Reframing the challenge of global wildfire threats to water supplies. Earth's Future (2018).

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